

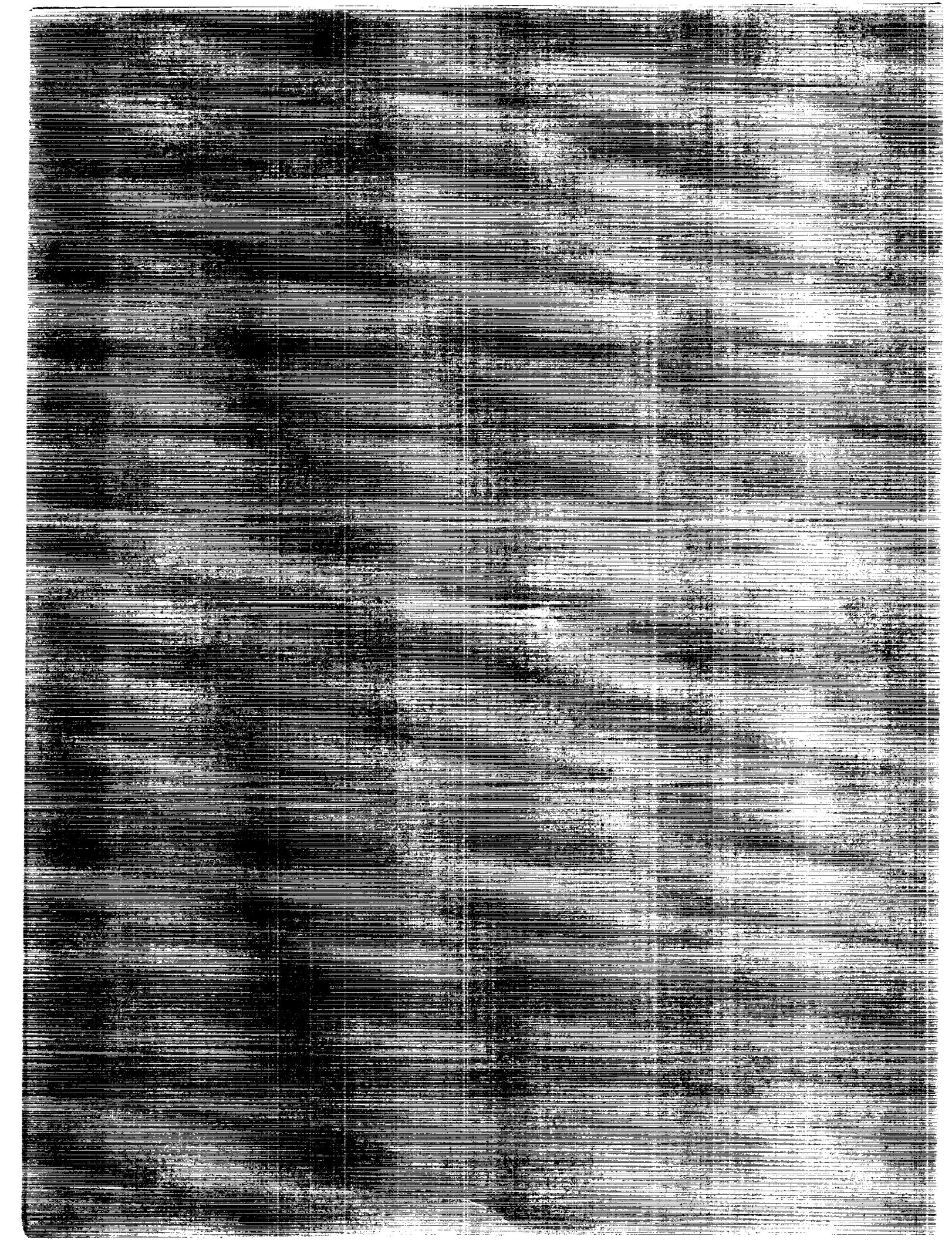
Contractor Report 4475

**Health Implications of the Space
Environment and Countermeasures:
Cardiovascular, Cardiopulmonary,
and Skeletal Discipline, 1980-1990**

Edited by
**Barbara Janice Wallace-Robinson,
John D. Stenger, and Elizabeth Hess**

PART I: NASW-4324
SEPTEMBER 1992

NASA



NASA Contractor Report 4475

Publications of the Space
Physiology and Countermeasures
Program, Cardiopulmonary
Discipline: 1980–1990

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Prepared for
NASA Office of Space Science and Applications
under Contract NASW-4324



National Aeronautics and
Space Administration

Office of Management

Scientific and Technical
Information Program

1992

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PREFACE

This bibliography contains publications resulting from research supported by the Cardiopulmonary Discipline of the NASA Space Physiology and Countermeasures Program during the years 1980-1990. It is one of a series of four bibliographies being published in 1992 of the disciplines of the Space Physiology and Countermeasures Program. Others in this series include publications from the Regulatory Physiology, Musculoskeletal, and Neuroscience Disciplines. Portions of this compilation have been published previously as part of a series of bibliographies of space biomedical research. Previous editions in this series cover the years 1980-1982 (NASA CR-3587), 1982-1983 (NASA CR-3739), 1983-1984 (NASA CR-3860), 1984-1986 (NASA CR-4184), and 1987-1988 (NASA CR-187840).

This bibliography is divided into sections: Fluid Shifts, Cardiovascular Fitness and Exercise, Cardiovascular Physiology, Pulmonary Physiology, and General Physiology. The Fluid Shifts section is concerned with the effects of the headward fluid shift, which occurs in weightlessness, on cardiovascular function, kidney function, and the renin-angiotensin system. (Other fluid and electrolyte references can be found in *Publications of the Space Physiology and Countermeasures Program, Regulatory Physiology Discipline: 1980-1990*, NASA CR-4469.) The Cardiovascular Fitness and Exercise section incorporates studies of cardiovascular fitness, exercise dynamics, and the correlation of differences in fitness levels and cardiovascular changes. The Cardiovascular Physiology section includes references on general cardiovascular functioning or references that incorporate elements of more than one of the previous sections. The Pulmonary Physiology section involves studies of the pulmonary system, including lung function and gas exchange. The last section, General Physiology, is included to provide the reader with additional, background material in space physiology research. NASA-funded investigators whose work resulted in these publications are identified by an asterisk. A principal investigator index of researchers conducting Cardiopulmonary investigations, as well as a list of Cardiopulmonary investigators and their affiliations, are also included in the bibliography.

As part of our continuing interaction with the scientific and professional community, we are pleased to present this bibliography in an effort to stimulate an exchange of information and ideas among scientists working in this discipline. I would like to thank April Commodore Roy and Audrey Robin Brown for their technical assistance in the production of this bibliography.

Janis H. Stoklosa, Ph.D.
Manager, Space Physiology and Countermeasures Program

INTRODUCTION

The Cardiopulmonary Discipline is part of the Space Physiology and Countermeasures Program of the NASA Life Sciences Division. Space life sciences research was initiated in 1960 with the goal of enabling human survival in space. Now, in the late 20th century, the program is evolving to ensure human health and productivity on space missions: on the space shuttle in the 1990s, then on Space Station Freedom, and ultimately on the Moon and missions to Mars.

The goals of the Cardiopulmonary Discipline are to understand the acute and long-term cardiovascular and pulmonary adaptation to space and readaptation to a gravity environment, including the associated mechanisms, and to develop physiological countermeasures to ensure crew health in space and on return to Earth. The Cardiopulmonary research program is comprised of two subdisciplines: Cardiovascular and Pulmonary. This multidisciplinary effort incorporates basic, applied, and operational research, both ground-based and in-flight. Research, conducted at NASA centers and in universities, includes human and animal (rats and non-human primates) subjects.

The Cardiovascular subdiscipline is concerned with the nature, time course, and sequence of cardiovascular adjustments to spaceflight. It also seeks to determine the most effective countermeasures (e.g., lower body negative pressure, fluid rehydration, pharmacology, centrifugation, exercise and/or anti-g devices) to combat adverse cardiovascular effects and when and how they should be applied. Other areas of interest include orthostatic hypotension, cardiovascular responses to extravehicular activity (EVA), and the relationship between the cardiovascular adjustments to spaceflight and those occurring in Earth-based models such as bedrest, immersion, and head-down tilt.

The Pulmonary subdiscipline includes the study of the effects of the space environment on lung function. Specific areas of interest include lung volume, ventilation and blood flow, changes in respiratory muscle structure and function, gas exchange, and the penetration by aerosol particles in the lung. It is also concerned with the relationship between the pulmonary adjustments to spaceflight and those occurring in Earth-based models such as bedrest, immersion, and head-down tilt.

Janis H. Stoklosa, Ph.D.
Manager, Space Physiology and Countermeasures Program

FLUID SHIFTS



Aratow, M.; Coutts, R.D.; Mai, M.T.; Blevins, F.T.; Crenshaw, A.; Hargens*, A.R.
The effect of continuous passive motion on muscle compartment pressure and femoral vein flow in the lower extremity (Abstract).
Transactions of the Annual Meeting, Orthopaedic Research Society 14: 573, 1989. (GWU 6732)

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Effect of simulated weightlessness on the postural response of microvascular cutaneous blood flow.
Physiologist 33(1, Suppl.): S54-S55, 1990. (GWU 11705)

Arbeille, Ph.; Lebouard, D.; Patat, F.; Pottier, J.M.; Buckey*, J.; Beck, L.; Blomqvist*, G.; Gharib, C.; Pourcelot, L.
Variations of the renal flow in relation with the volemia.
Physiologist 33(1, Suppl.): S175-S176, 1990. (GWU 11707)

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Physiologist 33(1, Suppl.): S163-S164, 1990. (GWU 13528)

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Fluid distribution pattern induced by intravenous fluid loading during HDT.
Paper presented at the 40th Congress of the International Astronautical Federation, Malaga, Spain, October 7-12, 1989, 5 p. (IAF-89-599) (GWU 12620)

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Experimental Neurology 82(2): 325-334, 1983. (GWU 5586)

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Role of the renin-angiotensin system in the control of vasopressin and ACTH secretion during the development of renal hypertension in dogs.
Hypertension 6(1): 35-41, 1984. (GWU 5748)

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Physiologic response of water immersion in the rhesus monkey (Abstract).
Physiologist 26(4): A11, 1983. (GWU 4908)

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Water immersion in the conscious rhesus monkey (Abstract).
Physiologist 25(4): 298, 1982. (GWU 3414)

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Kidney International 25(1): 285, 1984. (GWU 5744)

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FASEB Journal 4(4): A1080, 1990. (GWU 12160)

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Clinical Research 38(2): 414A, 1990. (GWU 14005)

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Physiologist 33(4): A55, 1990. (GWU 12169)

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Circulation 82(4, Suppl. III): III-401, 1990. (GWU 14056)

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Aviation, Space, and Environmental Medicine 59(1): 40-43, 1988. (GWU 8621)

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Effects of 10 days of head down tilt on the compliance of the lower limb (Abstract).

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Medicine and Science in Sports and Exercise 22: S114, 1990. (GWU 2913)

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Kidney International 21(1): 149, 1982. (GWU 2384)

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February 6-9, 1989, 1 p. (GWU 13399)

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Transactions of the Annual Meeting, Orthopaedic Research Society 11: 408-409, 1987. (GWU 10696)

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REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE November 1992	3. REPORT TYPE AND DATES COVERED CONTRACTOR REPORT	
4. TITLE AND SUBTITLE PUBLICATIONS OF THE SPACE PHYSIOLOGY AND COUNTERMEASURES PROGRAM, CARDIOPULMONARY DISCIPLINE: 1980-1990		5. FUNDING NUMBERS C NASW-4324	
6. AUTHOR(S) JANET V. POWERS, JANICE WALLACE-ROBINSON, KATHERINE J. DICKSON, AND ELIZABETH HESS			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) SCIENCE COMMUNICATION STUDIES, DCE THE GEORGE WASHINGTON UNIVERSITY WASHINGTON, DC 20006		8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) LIFE SCIENCES DIVISION OFFICE OF SPACE SCIENCE AND APPLICATIONS NASA HEADQUARTERS, WASHINGTON, DC 20546		10. SPONSORING/MONITORING AGENCY REPORT NUMBER NASA CR-4475	
11. SUPPLEMENTARY NOTES FOR PREVIOUS EDITIONS IN THIS SERIES, SEE NASA CR-3587, NASA CR-3739, NASA CR-3860, NASA CR-4184, AND NASA CR-187840.			
12a. DISTRIBUTION/AVAILABILITY STATEMENT UNCLASSIFIED - UNLIMITED SUBJECT CATEGORY 52		12b. DISTRIBUTION CODE	
13. ABSTRACT (minimum 200 words) A 10-YEAR CUMULATIVE BIBLIOGRAPHY OF PUBLICATIONS RESULTING FROM RESEARCH SUPPORTED BY THE CARDIOPULMONARY DISCIPLINE OF THE SPACE PHYSIOLOGY AND COUNTERMEASURES PROGRAM OF NASA'S LIFE SCIENCES DIVISION IS PROVIDED. PRIMARY SUBJECTS INCLUDED IN THIS BIBLIOGRAPHY ARE FLUID SHIFTS, CARDIOVASCULAR FITNESS, CARDIOVASCULAR PHYSIOLOGY, AND PULMONARY PHYSIOLOGY. GENERAL PHYSIOLOGY REFERENCES ARE ALSO INCLUDED. PRINCIPAL INVESTIGATORS WHOSE RESEARCH TASKS RESULTED IN PUBLICATION ARE IDENTIFIED BY AN ASTERISK. PUBLICATIONS ARE IDENTIFIED BY A RECORD NUMBER CORRESPONDING WITH THEIR ENTRY IN THE LIFE SCIENCES BIBLIOGRAPHIC DATABASE, MAINTAINED AT THE GEORGE WASHINGTON UNIVERSITY.			
14. SUBJECT TERMS CARDIOVASCULAR PHYSIOLOGY, PULMONARY PHYSIOLOGY, FLUID SHIFTS, FITNESS, CARDIOPULMONARY SYSTEM		15. NUMBER OF PAGES 124	16. PRICE CODE A08
17. SECURITY CLASSIFICATION OF REPORT UNCLASS	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASS	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASS	20. LIMITATION OF ABSTRACT UNLIMITED

